

# Cyclotronic Plasma Actuator with Arc-Magnet for Active Flow Control, Phase I

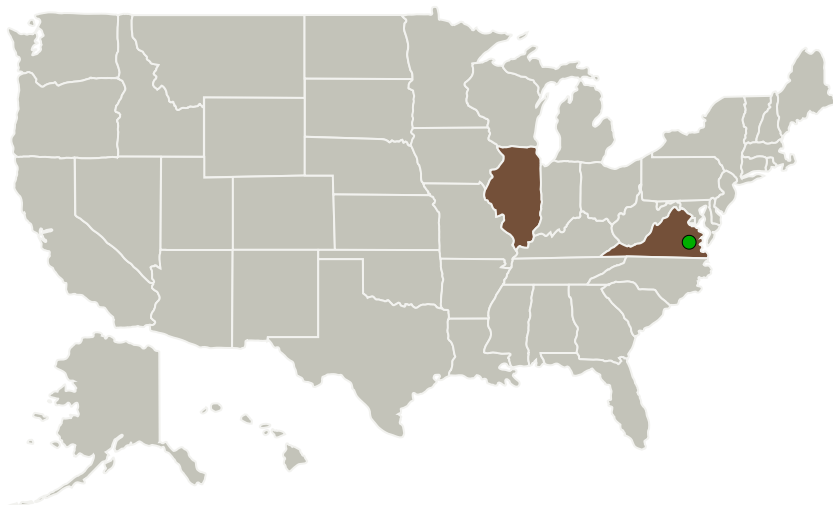
Completed Technology Project (2016 - 2016)



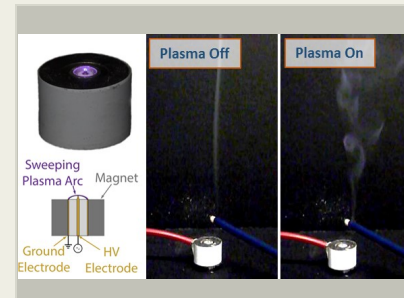
## Project Introduction

CU Aerospace and team partner the University of Illinois at Urbana-Champaign propose to develop a new type of plasma-based flow control actuator, which uses a high-voltage electrode that arcs to a cylindrical grounded electrode within a magnetic field. The result is that an arc plasma can be produced, with a Lorentz force that creates a plasma disc (similar concept to a cyclotron). The thought behind this concept is that the thermal actuator authority provided by the plasma arc is coupled with an induced swirl component into a boundary-layer flow, which will enhance mixing and allow flows to remain attached in high adverse pressure gradients. Effectively, the proposed actuator would function like vortex generators that one could enable or disable on command. This subsystem demonstration will pioneer a family of devices to address a notoriously difficult problem in active flow control.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
CU Aerospace, LLC	Lead Organization	Industry	Champaign, Illinois
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia



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## Primary U.S. Work Locations

Illinois

Virginia

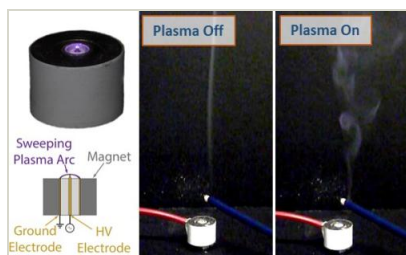
## Project Transitions

**June 2016:** Project Start**December 2016:** Closed out

## Closeout Documentation:

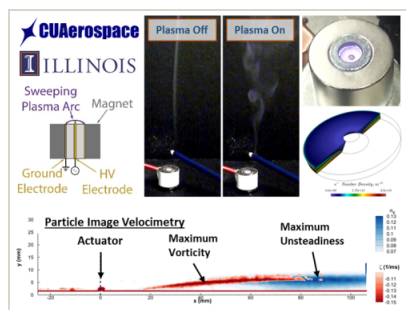
- Final Summary Chart(<https://techport.nasa.gov/file/139684>)

## Images



## Briefing Chart Image

Cyclotron Plasma Actuator with Arc-Magnet for Active Flow Control, Phase I

(<https://techport.nasa.gov/image/132232>)

## Final Summary Chart Image

Cyclotron Plasma Actuator with Arc-Magnet for Active Flow Control, Phase I Project Image

(<https://techport.nasa.gov/image/132629>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

CU Aerospace, LLC

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

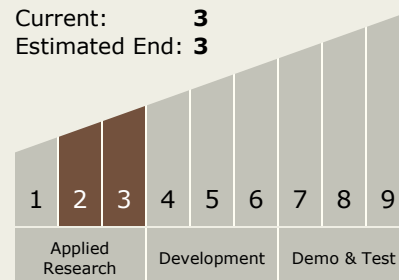
Carlos Torrez

## Principal Investigator:

David L Carroll

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Technology Areas

### Primary:

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.5 Propulsion Flowpath and Interactions

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System